SIBLING COMMUNICATION AND AAC

BY

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Abstract

For individuals who use augmentative and alternative communication (AAC), success of communicative interactions depends in part on the communication skills and interaction styles of their communication partners. In order to enhance the interactions between AAC users and their communication partners, research involving the instruction of communication partners to use interaction strategies that support the communication of AAC users has been completed. To date, there are no studies that include siblings of AAC users as participants in these communication partner instruction programs. In the current study, 2 siblings developing typically participated in a communication partner instruction program where they were taught how to use three communication strategies, aided AAC modeling, pause time, and prompting, with their sibling who uses AAC. Data was collected on the frequency of their strategy use in a game context with their sibling who uses AAC. Results showed that for one sibling the treatment was very effective. For the other sibling, however, the treatment effectiveness was questionable. There are several variables that may have affected these findings and these will be discussed in this paper. Clinical implications of the findings are also discussed.

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Chapter I: Introduction

Communication is a complex, dynamic process that requires each individual participating in the communicative interaction to have necessary skills to make that interaction successful. Individuals with complex communication needs (CCN) must use another mode of communication in addition to natural speech to fully meet their communication needs. Some individuals use augmentative and alternative communication (AAC) to meet these communication needs. For these individuals, success of communicative interactions depends in part on the communication skills and interaction styles of their communication partners (Blackstone, 1991, 1999; McNaughton, Rackensperger, Benedek-Wood, Krezman, Williams, & Light, 2008). Research has demonstrated that communicative interactions between individuals who use AAC and their communication partners tend to be dominated by the verbal communication partner, with the AAC user being a passive communicator (Blackstone, 1999; Light, 1988, 1997; Light, Binger, Kelford-Smith 1994; Light, Collier, & Parnes, 1985a, 1985b). Therefore, training communication partners how to effectively communicate with AAC users is a critical intervention component (Blackstone, 1991, 1999; Johnson, Inglebret, Jones, & Ray, 2006; Light, 1988, 1997; Sigafoos, 1999). Several studies have addressed this issue and successfully trained communication partners to more positively interact with AAC users and support their communicative interactions (Carter & Maxwell, 1998; Light, Dattilo, English, Gutierrez, & Hartz, 1992; Trembath, Balandin, Togher, & Stancliffe, 2009; Trottier, Kamp, & Mirenda 2011).

These studies, among others, have identified specific communication strategies or interaction skills that have been taught to communication partners and used with

individuals with developmental disabilities. These strategies include aided AAC modeling, providing pause time, and prompting. These targets have been beneficial to use with individuals who have CCN and use AAC (Binger, Kent-Walsh, Berens, Del Camp, & Rivera, 2008; Binger, Kent-Walsh, Ewing, & Taylor, 2010; Binger & Light, 2007; Drager, Postal, Carrolus, Castellano, Gagliano, & Glynn, 2006; Light & Binger, 1998; Light et al., 1992; Sigafoos, Didden, Roberts, Phillips, & Goodison, 1996; Trottier et al., 2011). Although research has been consistent in identifying and using these specific interaction skills as intervention targets, the methods and procedures in which these targets have been taught vary throughout the literature. Kent-Walsh and McNaughton (2005) stated that using an effective and efficient instructional method during communication partner intervention is critical in order for the communication partner to make significant changes in their interaction style. To address this issue, Kent-Walsh and McNaughton (2005) developed an eight-step instructional model to use during communication partner instruction. Based on this model, Kent-Walsh, Binger, and colleagues developed the Improving Partner Applications of Augmentative Communication Techniques (ImPAACT) Program. A modified version of this program will be used in the current study.

There are many individuals who are part of an AAC user's life and research has shown positive, beneficial outcomes when providing communication partner instruction to these individuals. In many cases, the family of an AAC user is a significant part of their daily life; they are critical components in supporting the AAC user to be a successful and competent communicator. Several studies have provided communication partner instruction to parents of individuals who use AAC (Binger et al., 2008; Kent-

Walsh, Binger, Hasham 2010; Rosa-Lugo & Kent-Walsh, 2008). These instructions were successful in changing the interaction style between the parent and their child who uses AAC. However, no studies to date have focused specifically on providing communication partner instruction to siblings of AAC users, even though they may be one of the user's most significant and frequent communication partners (Blackstone, 1999). The present study aims to determine if teaching communication strategies to siblings of AAC users increases the siblings' use of these strategies when in a natural context with their sibling who uses AAC.

Communication Between AAC Users and Their Partners

Individuals who use AAC interact with a variety of communication partners throughout their daily lives. Partners play a critical role in the communication of AAC users. The success of communicative interactions with individuals who use AAC will depend on the interaction skills of the communication partner. Interactions between communication partners and AAC users have been documented to be one-sided (Blackstone, 1999; Light, 1988, 1997; Light et al., 1994; Light et al., 1985a, 1985b). Therefore, training communication partners to use beneficial interactions skills is critical in order for the communicative interactions between the AAC user and their partner to be more positive, successful, and equal.

It has been documented in the literature that individuals who use AAC display certain interaction styles that create unbalanced communicative interactions, often with the AAC users communicating infrequently. AAC users have been observed in communicative interactions to (a) produce a limited range of communicative functions, (b) be passive communicators during the interaction, (c) initiate few communicative

interactions, (d) respond only when necessary, and (e) use restricted linguistic forms (Blackstone, 1999; Light, et al., 1985a, 1985b; Light, 1988; Light et al., 1994). When studying interaction patterns between young children who are nonverbal and have physical disabilities and their primary caregivers, Light et al. (1985a) found that the children tended to forfeit half of their communicative turns in the interaction and only fulfilled these turns when they were required to do so. In another study reviewing the research on interaction patterns of individuals using AAC, Light (1988) noted that turn taking patterns within interactions could sometimes be asymmetrical; individuals using AAC occupied less of the conversational space than their verbal communication partners. Another study focused on the interaction styles during a storybook reading context between mothers and their preschool children who used AAC (Light et al., 1994). In this study, the children, who were very familiar with the storybook and had read the story many times before, did not take an active role in the communicative interactions; they continued to remain passive communicators even with the familiar context.

In comparison to AAC users' interactions styles, the interaction styles of the communication partners of AAC users tend to look very different. These interaction styles frequently do not support positive communicative interactions (e.g., Light et al., 1985a). Communication partners have been noted to (a) dominate the interactions, (b) ask mostly yes/no questions, (c) provide limited opportunities for the AAC user to initiate a conversation or respond during a conversation, (d) take the majority of conversational turns, and (e) often interrupt the message of the individual using AAC (Blackstone, 1999; Light et al., 1994; Light et al., 1985a). In addition to observing the interaction style of the AAC users, Light et al. (1985a) noted certain interaction styles used by the primary

caregivers when interacting with their children who were nonverbal and had physical disabilities. Light et al. (1985a) found that the communicative interactions were asymmetrical. The caregivers produced more than twice as many communicative turns during the interactions and they initiated more topics; therefore, the communication process was controlled almost completely by the caregivers. In another study, Light et al. (1994) focused on the interaction styles between preschoolers who use AAC and their mothers during storybook reading contexts. The authors found that the mothers in the study produced approximately 3 times as many communicative acts as their children and provided very few opportunities for the children to participate in the interaction. In addition, the mothers infrequently asked questions and seldom required their children to communicate during the storybook reading. Blackstone (1999) discussed the results of a survey given to 7 AAC users regarding their conversational experiences. In this survey, the AAC users reported that 'good' communication partners were those people who were interested, patient, and motivated in the conversation and were comfortable with all modes of communication. The AAC users also discussed the characteristics of communication partners that make communication interactions challenging. The AAC users reported that at times their communication partners underrated their abilities, shouted at them and over enunciated as though the AAC users were deaf, and talked to others instead of addressing them directly. According to Blackstone (1999), past researchers have also documented similar interaction styles typical of communication partners and have identified that these styles are not beneficial for and do not support positive communication interactions for AAC users. Blackstone (1999) concluded this article by stressing the importance of communication partner training in AAC

interventions and stated that ignoring systematic partner training limits the potential outcomes for individuals who use AAC. Given these findings, training communication partners to use more supportive interaction styles is critical in order to have positive, successful communicative interactions with AAC users.

The communication partner is a major factor in the success of communicative interactions (Blackstone 1991; Light 1988). Light (1997) discussed the nature of communicative competence for individuals who use AAC and stated that communicative competence is not something that resides only with the AAC user but with communication partners as well. In addition, Light (1997) stated that some individuals who are first developing communicative competence may need a significant amount of scaffolding support from their communication partners in order to be successful in their communication attempts. Communication partners, then, may require instruction in specific strategies to facilitate interactions and foster communicative competence (Light, 1997).

Sigafoos (1999) provided a review of empirically validated instructional strategies that have been used in AAC interventions. He stated that it is the responsibility of the communication partner to identify opportunities and create a need for the AAC user to communicate. Parents, teachers, and peers may need support and training if they are to act as effective communicative partners to individuals with developmental disabilities who use AAC (Sigafoos, 1999). In addition, Blackstone (1999) discussed the implications of instructional programs training communication partners. According to Blackstone (1999), research has shown that easily administered programs can result in communication partners changing their behaviors in ways that improve the quality of the

interactions augmented communicators engage in.

Johnson et al. (2006) solicited the perspectives of 275 speech-language pathologists regarding the success versus abandonment of AAC systems. The speech-language pathologists stated that the top two factors affecting abandonment of the AAC system were related to the AAC users' communication partners. Specifically, the respondents indicated that abandonment was related to partners who felt they could understand the user without the system and/or partners who didn't provide sufficient opportunities for the AAC user to communicate with the system (Johnson et al. 2006). The speech-language pathologists in the study further indicated that when partners were not instructed as to how to be consistent in their conversational techniques, the AAC system was more likely to be abandoned (Johnson et al. 2006).

Past research has indicated that the interaction styles of communication partners do not always support positive communicative interactions between AAC users and others. Research has also provided evidence that many communication partners need to learn appropriate interaction styles and need to be instructed on how to best communicate with individuals who use AAC. To address this need, several studies have trained communication partners in ways to interact with the AAC user to best support their communication needs.

Communication Partner Instruction

Carter and Maxwell (1998) examined the effects of a partner directed intervention program focusing on the social interactions between peers developing typically and students who used AAC within a classroom setting. Peers were given information about the helpful communication strategies to use with AAC users (e.g., waiting for responses,

responding to communicative attempts) and then asked to demonstrate these strategies in a role play with the researcher and other peers. Results of this study showed that peers increased their use of these targeted communication strategies after instruction. In addition, the amount of social interaction between AAC users and their peers increased within the classroom setting following instruction.

Light et al. (1992) evaluated the efficacy of an instructional program that taught facilitators interaction strategies that would better support the communication of AAC users. Three facilitators were instructed in four 1-hour sessions on specific interaction strategies to use with the AAC users. These strategies were to allow the AAC user sufficient time to communicate and to be responsive to the user's communicative attempts. After instruction, the facilitators decreased the amount of turns they took in the conversation, decreased the number of initiations they issued, and increased the amount of turns that were responsive to the AAC users' communicative attempts. The AAC users demonstrated positive changes as well. After facilitator instruction, the AAC users were observed to use more complex linguistic content during communicative turns and use more initiations during the interactions. The facilitators dominated the interactions less and instead the conversational control was shared between the facilitator and AAC user (Light et al., 1992).

Trembath et al. (2009) focused on teaching peers of preschoolers with autism spectrum disorder (ASD) to use naturalistic teaching with and without AAC. One set of peers was taught naturalistic teaching alone and the other set of peers was taught naturalistic teaching and modeling the use of the speech generating device (SGD). Results showed that when peer-mediated naturalistic teaching was combined with the

AAC device there was an increase in the communicative behaviors produced from baseline to intervention by each of the children with ASD. In addition, the children with ASD also generalized these increases to mealtime interactions with peers (Trembath et al., 2009). These results provide evidence supporting the effectiveness of combining peer-mediated naturalistic teaching with SGDs for preschool children with ASD (Trembath et al., 2009).

In a recent study conducted by Trottier et al. (2011) six peers were instructed how to support two students with ASD to use their SGDs when interacting in a game context. The peers were taught to use verbal and gestural prompts to increase the students' use of the SGDs. Results of the study indicated that the peers developing typically acquired the skills necessary to support the SGD use by the students with ASD. In addition, results showed that one of the participants with ASD showed dramatic increases in the frequency of his spontaneous communicative acts. The other participant, however, did not show significant changes in the amount of spontaneous communicative acts produced from baseline to intervention. Although both participants increased their frequency of communicative acts, a functional relationship between the intervention and changes in the participants' communicative performance could not be established because only one participant made significant change.

These studies illustrate the feasibility of training communication partners how to use behaviors that will better facilitate positive communicative interactions with AAC users. The results of these studies provide evidence of the positive effects that can result when communication partners receive instruction on ways to be more supportive in interactions with individuals who use AAC. Often times, specific communication

strategies are used as intervention targets in communication partner instructions because they support positive communicative interactions for the AAC user (Binger et al., 2008, 2010; Binger & Light, 2007; Drager et al., 2006; Light & Binger, 1998; Light et al., 1992; Trottier et al., 2011).

Communication Strategies

There have been specific communication strategies used with AAC users that have been beneficial in creating successful communicative interactions between AAC users and their communication partners. These strategies have also been effective in teaching AAC users how to use their AAC devices (Binger et al., 2008, 2010; Binger & Light, 2007; Drager et al., 2006; Light & Binger, 1998; Light et al., 1992; Trottier et al., 2011). Light and Binger (1998) stated that it may be essential for communication partners to learn these strategies in order to support successful communication for individuals who use AAC. Specific strategies such as aided AAC modeling, (Binger et al., 2008, 2010; Binger & Light, 2007; Drager et al., 2006) providing pause time, (Binger et al. 2008; 2010; Light & Binger, 1998; Light et al., 1992; Seung, Ashwell, Elder, & Valcante, 2006) and prompting (Binger et al., 2010; Sigafoos et al., 1996; Trottier et al., 2011) have often been intervention targets during communication partner instruction. Communication partners were trained how to use these strategies in order to enhance communicative interactions and increase communication between individuals with developmental disabilities and their communication partners.

One communication strategy that has been beneficial to use when interacting with and teaching AAC users is modeling of the AAC system. This occurs when the communication partner activates a symbol on the AAC device while simultaneously

speaking the same word or phrase. This strategy provides a model to the AAC user that is consistent with the mode that is expected for them to use, shows the user that the AAC system is an acceptable form of communication, and demonstrates to the individual how the system can be used (Drager, 2009). For individuals who struggle comprehending only spoken information, this strategy may facilitate comprehension by providing additional visual information along with verbal information (Drager, 2009). There are many terms used to describe modeling of the AAC system (Binger & Light 2007; Cafiero 2001; Drager et al., 2006; Goosens, Crain, Elder, 1992; Romski & Sevcik, 1996). For the present study, aided AAC modeling will refer to the action of activating an aided symbol while simultaneously speaking that same word or phrase.

Several studies have provided evidence that using aided AAC modeling is beneficial when interacting with AAC users and it is a strategy that can be taught to communication partners (Binger et al., 2008, 2010; Binger & Light, 2007; Drager et al., 2006). Drager et al. (2006) examined the effectiveness of using aided AAC modeling, which they referred to as Aided Language Modeling (ALM), as a teaching strategy to facilitate symbol comprehension and expression in two preschool children with ASD. During play, the researchers pointed to a target object, then pointed to the corresponding symbol on the communication board while simultaneously verbalizing the symbol. Results of this study indicated that aided AAC modeling was effective in increasing symbol comprehension and symbol production for the two preschool children with ASD. The results further demonstrated that AAC symbols can be used in a receptive and expressive capacity and adult models can result in children with ASD acquiring new symbol vocabulary (Drager et al., 2006).

Binger and Light (2007) examined the effects of using aided AAC models on the production of multi-symbol messages by preschoolers who use AAC. During play activities, the researchers pointed to two symbols on the children's AAC systems and then provided a grammatically complete spoken model. They discovered that the aided AAC modeling was effective in increasing the production of the multi-symbol messages by four of the five preschoolers. The four preschoolers also began to produce a variety of different types of messages (Binger & Light, 2007).

Researchers have also demonstrated that aided AAC modeling can be taught to communication partners and implemented by these partners in storybook reading contexts (Binger et al., 2008; 2010). Binger et al. (2008) taught parents how to use a specific interaction strategy during storybook reading with their children who used AAC. This interaction strategy consisted of the parents (a) reading a page in the story while providing an aided AAC model, (b) asking a wh-question while providing an aided AAC model, and (c) answering the wh-question while providing an aided AAC model. This strategy required the parents to use aided AAC modeling throughout the entire reading. In a similar study conducted by Binger et al. (2010), researchers trained educational assistants how to use a similar interaction strategy when reading to young students who used AAC. Aided AAC modeling was again a large component of this interaction strategy. Results from both studies demonstrated that the communication partners (e.g., the parents and educational assistants) learned to implement the interaction strategy consistently and effectively. In addition, after instruction, the AAC users increased their use of multi-symbol messages and started using a variety of different symbol combinations (Binger et al., 2008, 2010). Research has demonstrated that using aided

AAC modeling when interacting with AAC users is beneficial in supporting the AAC user's language growth and is a strategy that can be successfully taught and implemented by various communication partners (Binger et al., 2008, 2010; Binger & Light, 2007; Drager et al., 2006).

Another strategy that has been used with individuals with complex communication needs (CCN) is providing pause time. This strategy has been demonstrated to support positive communicative interactions with both AAC users and individuals who do not use AAC but have CCN (Binger et al. 2008; 2010; Light & Binger, 1998; Light et al., 1992; Seung et al., 2006). Pause time, which is sometimes referred to as expectant delay, is the action of waiting for a specific period of time for the individual with CCNs to communicate or complete a target skill. During this time, the communication partner also indicates an expectant delay by using an expectant facial expression, such as raising their eyebrows, and changing their body posture by leaning forward. These changes further indicate to the individual that it is their turn to communicate (Light and Binger, 1998).

Light and Binger (1998) discussed building communicative competence with AAC users. The authors indicated that waiting and providing the AAC user with enough time to communicate is an important interaction strategy that helps support the individual in developing new communication skills. The authors also stated that using an expectant delay allows extra time for the AAC user to process the natural cues, formulate the required turn, and then actually produce their conversational turn. In addition, the authors suggested that using pause time is especially appropriate and beneficial for someone who is rarely provided with the opportunity to communicate in the natural environment (Light

and Binger, 1998).

Light et al. (1992) evaluated the efficacy of an instructional program teaching facilitators interaction strategies to better support the communication of AAC users. The authors trained three adult facilitators to use several strategies, including pause time, when interacting with AAC users. The facilitators in the study learned to use the interaction strategies taught to them. Following instruction, the facilitators decreased their rates in turn-taking and initiations and increased the proportion of turns that were responsive to the AAC users' communicative attempts. In addition, the AAC users increased their rates of initiations and were observed to be more active in the interaction with their facilitator by using more complex linguistic content when they took communicative turns. Positive changes in the communication between the AAC user and the facilitator were demonstrated when these interaction strategies, including providing pause time, were used.

Another study conducted by Seung et al. (2006) provided positive evidence for the use of pause time when interacting with individuals with autism. The authors in the study examined the efficacy of an in-home training program consisting of teaching expectant waiting and imitation with animation skills to fathers of children with ASD. The fathers were instructed to prompt the child's behavior and then wait 3 or more seconds while providing the child with facial expressions and positions that signaled the availability of a social interaction (Seung et al, 2006). Results of the study indicated that after the training, parents made positive changes in giving the children time to respond and did not dominate the conversational space by continually talking. In addition, the children increased their utterances during the communicative interactions with their

parents.

In two more studies, Binger et al. (2008, 2010) taught parents to use an interaction strategy during storybook reading with their children who used AAC. The interaction strategy required that the communication partners provide pause time of at least 5 seconds between each aided AAC modeling event during the storybook reading context. Positive effects were shown in both studies; the communication partners changed their interaction style and the AAC users increased their productions of multi-symbol messages (Binger et al., 2008, 2010). Based on the research described, pause time positively impacts communicative interactions with AAC users and can be taught to communication partners.

A third communication strategy that has been beneficial in supporting AAC user's communicative interactions is use of verbal and/or gestural prompts (Binger et al., 2010; Sigafoos et al., 1996; Trottier et al., 2011). According to Nietzal & Wolery (2009) prompting procedures include any assistance given to learners that help them use a skill. Prompts are usually given before or as a learner is attempting to use a specific skill (Nietzal & Wolery, 2009).

Sigafoos et al. (1996) conducted a research study in which two children with multiple disabilities were taught to request food and drink items by pointing to corresponding line drawings. Researchers used verbal and physical prompting with the participants in order to establish discriminated and generalized requests for foods and drinks during a morning snack time. Results showed that the procedures used in the study were effective in teaching generalized and discriminated use of the food and drink symbols to the children (Sigafoos et al., 1996). The use of verbal prompts was also

implemented in the study conducted by Binger et al. (2010). The researchers trained educational assistants on how to use an interaction strategy when reading to their young students who used AAC. This interaction strategy was similar to the strategy used in the Binger et al. (2008) study. The educational assistants in this study were instructed to use verbal prompts when implementing the interaction strategy. Following the instruction, the educational assistants learned to implement the interaction strategy appropriately and effectively. In addition, the AAC users increased their use of multi-symbol messages and started using a variety of different symbol combinations. Positive changes in the interactions between the communication partner and AAC user were demonstrated (Binger el al., 2010).

Trottier et al. (2011) investigated the effects of a peer-mediated intervention designed to support communication during social games for two students with ASD who used SGDs. In this study, verbal and gestural prompts were used, which, as described by the authors, were designed to either get the attention of the AAC user or direct the user to activate a message on the AAC device (Trottier et al., 2011). The peers in the study were first taught how to use prompting in order to facilitate their peers' use of their SGD. Then, during a game context, peers were instructed to provide one or more verbal and/or gestural prompts to encourage their peers with ASD to activate words or phrases on their SGD relating to the game. Results showed that the peers were able to acquire the skills needed to support SGD use by the students with ASD. In addition, the intervention was effective at increasing total communicative acts by the students with ASD (Trottier et al., 2011).

Although the literature varies as to how communication partner instruction was

implemented, research is consistent in identifying effective communication strategies to teach during communication partner instructional programs. Aided AAC modeling, providing pause time, and prompting are three communication strategies that have been identified as being effective intervention strategies that support AAC users in having positive, successful communicative interactions. In addition, studies have shown that communication partners can be taught how to use these strategies and can effectively implement these strategies when interacting with AAC users. Though the strategies in the research described were consistent, the instructional models were not.

Instructional Program

There have been several studies in which communication partners were trained to use specific strategies with AAC users to better support interactions with those individuals. These studies, however, differ in the method and procedures they use during the instructional portion of the study. According to Kent-Walsh and McNaughton (2005) "little attention has been paid to the most effective and efficient instructional methods for communication partner intervention programs" (p.195). To address this issue, these authors developed an eight-step strategic model that can be used in communication partner instruction programs when targeting any interaction strategy for use by the communication partners (e.g. use of expectant delay, modeling of the AAC system). This strategic model is based on the strategy instruction model created by Ellis, Deshler, Lenz, Schumaker, and Clark (1991). This model provides evidence-based instructional guidelines to help learners acquire targeted strategies that can be used in a variety of settings and activities and can be maintained over time (Ellis et al., 1991). Several studies have documented the efficacy of using the guidelines outlined in the eight-step model

during communication partner instruction programs (Binger et al., 2008, 2010; Roso-Lugo & Kent-Walsh 2008; Kent-Walsh et al, 2010).

Roso-Lugo and Kent-Walsh (2008) used Kent-Walsh and McNaughton's (2005) eight-step instructional model to teach parents to use an interaction strategy with their children who used AAC. The interaction strategy incorporated use of aided AAC modeling, expectant delay, open-ended questions, and increased responsiveness to communicative attempts. This study demonstrated that with a small amount of instruction using the procedures in the eight-step instructional model, communication partners developed the skills necessary to effectively implement interaction strategies with AAC users. In addition to these results, the AAC users in this study demonstrated significant increases in their communicative turns taken and the novel semantic concepts expressed (Rosa-Lugo & Kent-Walsh, 2008).

Based on the guidelines set in the eight-step communication partner instructional model (Kent-Walsh & McNaughton 2005), Kent-Walsh, Binger, and colleagues developed the ImPAACT Program. This program was designed to teach communication partners how to facilitate the language and communication skills of children who use AAC. Several studies have used this program and have been successful in changing the communication partners' interaction skills with AAC users (Binger et al., 2008; Binger et al., 2010; Kent-Walsh et al., 2010). In the first study, Binger et al. (2008) used the program to instruct three Latino parents how to increase the multi-symbol message productions of their children who used AAC. A second study conducted by Kent-Walsh et al. (2010) used the program to teach parents an interaction strategy to increase the turn-taking rates of their children who used AAC. A third study conducted by Binger et al.

(2010) evaluated the effectiveness of using the ImPAACT program to instruct educational assistants to teach their students to create symbol combinations on their SGDs. In all three studies, the communication partners who participated in the instruction were able to learn and effectively implement the interaction strategy with the AAC users. The partners also maintained their use of the strategy and generalized their use of the strategy to novel book-reading activities. In addition, the AAC users demonstrated positive changes in their communication after instruction. They increased their turn-taking rates and used a wider range of semantic concepts (Kent-Walsh et al., 2010) and also increased their use of multi-symbol messages (Binger et al., 2008; Binger et al., 2010).

In these three studies (Binger et al., 2008, 2010; Roso-Lugo & Kent-Walsh 2008; Kent-Walsh et al, 2010) a total of 14 participants have used the ImPAACT program during the communication partner instruction. The positive results from these studies provide evidence for the efficacy of using the ImPAACT program procedures when teaching communication partners how to improve their interaction skills with children who use AAC. This study will use a modified version of the ImPAACT program during the communication partner instruction. Family members, specifically parents, have been participants in three of the four studies using these procedures and have been able to positively change their interaction styles with their children.

Family Involvement

Family members are significant in a child's life; they are the most influential, secure, and valuable people in a child's life (Dunlap, 1999). In recent years, researchers and practitioners have begun to document the importance of including families in

intervention services with their children who use AAC (Cheslock, Romski, Sevcik 2007; Hurd 2007; McNaughton et al., 2008; Sevcik & Romski 2007). Researchers and professionals are finding that family involvement is a critical component to a child's success in learning to communicate with AAC. Family members must be included in the intervention process to increase the likelihood of success for the child (Iovannone, Dunlap, Huber, & Kincaid, 2003).

In an article discussing children, families, clinicians, and AAC, Sevcik & Romski (2007) stated that communication occurs 24 hours a day and AAC systems must be designed for use for this amount of time. This need, then, requires knowledgeable communication partners 24 hours a day; family members (parents, siblings, extended family) comprise these communication partners (Sevcik & Romski, 2007).

McNaughton et al. (2008) facilitated a focus group with 7 parents who had children who used AAC. The focus group discussed the benefits and challenges of learning AAC technology. Several themes emerged from this focus group indicating the importance of families being knowledgeable and involved in their AAC user's intervention services. One mother retold a story in which a technical problem occurred on her son's AAC device while he was at school. No one at the school knew how to fix the problem; therefore, he was without his AAC system until he returned home where a family member could fix the issue. In this case, only the family members of the AAC user had enough knowledge about the system to help resolve the problem. Other parents in the focus group discussed the important role they played in teaching their children how to use the AAC system to communicate. One mother reported that she had to do the majority of the teaching to her daughter because the school showed little to no

involvement (McNaughton et al., 2008). At the conclusion of the paper, McNaughton et al. (2008) noted that parents in the study played an important role in the selection of the AAC device, taught their children how to use the AAC system, promoted the use of the AAC in a variety of environments, and assessed progress and the need for new communication approaches and interventions. These parents' involvement and knowledge were necessary in order for the AAC users to be effective communicators.

Kramlich (2012) discussed the perspectives from general education teachers, students, and their parents regarding inclusion. She stated that parents may be the most knowledgeable person about their child's use of the SGD, the vocabulary in the device, the mounting of the device to the wheelchair, and the student's preferred access method. She further indicated that parents could be a valuable resource to help train others in the school about the AAC device and resolve issues that arise throughout the school year. In addition to these perspectives, 89% of the speech-language pathologists who participated in a study conducted by Johnson et al. (2006) felt that support for the system from the family of the user was an important factor in the long-term success of the AAC system.

Although literature has addressed the critical role families have in helping the AAC user have successful communicative interactions, only a few studies have been conducted providing communication partner instruction specifically to family members of AAC users (Binger et al. 2008; Kent-Walsh et al. 2010; Rosa-Lugo & Kent-Walsh, 2008). These studies have demonstrated positive changes in the interaction styles between the parents and the AAC users and were beneficial in increasing the AAC users communicative interactions.

Along with parents, siblings of AAC users are significant communication partners in an AAC user's life. One study conducted by James and Egal (1986) investigated the effects of a sibling training procedure, consisting of prompting and modeling, on the occurrence of free reciprocal interactions between a sibling developing typically and their sibling with physical disabilities. Results of this study showed positive changes between the siblings during free play. The sibling pairs increased their positive reciprocal interactions during play and retained this level of reciprocal interactions 6 months after the instruction (James & Egal, 1986).

Jones and Schwartz (2004) involved siblings, peers, and adults in their study in order to determine the effectives of using these groups as models for teaching novel language skills to children with ASD. The siblings, peers, and adult models were trained to look at a picture and respond appropriately by correctly labeling the target picture. For example, if a picture of a mechanic was shown the participants were trained to respond by correctly labeling the picture as 'mechanic'. This provided a correct model to the participants with ASD. Results from this study indicated that child models (peers and siblings) were effective, and often more effective, than the adult models in teaching the novel language skills to the children with ASD (Jones & Schwartz, 2004).

Taylor, Levin, and Jasper (1999) investigated the effects of using a video modeling procedure to increase the number of play-related statements made by two children with ASD to their siblings. The two children with ASD viewed videos of play interactions between their siblings and an adult. The results showed that after viewing the videos, the children with ASD made a high number of play-related comments across three different play situations. This study indicates that sibling modeling can be an

effective modeling procedure; however, because other types of procedures (e.g. modeling groups) were not evaluated, the authors were not able to determine how effective sibling models can be. Although siblings were participants in these studies, no studies to date have trained siblings to use communication strategies known to improve communicative interactions when interacting with the AAC user in their family.

Blackstone (2006) stated, "being an effective communication partner or AAC facilitator is not intuitive. It often requires an individual to change long-established, unconscious ways of communicating" (p. 12). Most people who interact with AAC users do not know what to do or how to support someone who may rely on other modes (other than natural speech) to communicate (Blackstone, 2006). Therefore, training communication partners to use supportive communication strategies when interacting with an AAC user is critical in order for AAC users and their partners to have positive communicative experiences. Siblings of AAC users are often one of the closest people in an AAC user's life. Yet, no research to date has focused on training siblings how to use communication strategies with their brother or sister who uses AAC.

The study aims to determine if teaching the communication strategies of aided AAC modeling, providing pause time, and prompting to siblings of AAC users increases their use of these strategies in a game context with their sibling.

CHAPTER II: Methods

Participants

The director of special education for the Lawrence school district was contacted via e-mail (Appendix A) to request permission to contact the speech-language pathologists in the district. Once approval was obtained, the speech-language pathologists from the Lawrence school district were contacted (Appendix B) via e-mail and asked to assist in distributing flyers (Appendix C) to families of children who use AAC in school. Those speech-language pathologists who expressed interest in helping recruit for the study were sent an attachment of the flyer via e-mail. In addition, these informational flyers were given to the Clinic Director at the University of Kansas Schiefelbusch Speech-Language-Hearing Clinic to distribute to families with children who use AAC and receive services at the Clinic. Interested families contacted the principal investigator through e-mail or phone. Participant selection for the study required that participants be sibling pairs that included a sibling developing typically who was between the ages of 7-15 and a sibling who used AAC. During the initial meeting, the mothers of both sibling pairs signed a consent form (Appendix D) allowing their children to participate in the study. In addition, both the sibling developing typically and the sibling who used AAC gave oral assent to participate in the study (Appendix E).

In total, 2 sibling pairs participated in the study. Sibling Pair 1 consisted of an 11 year old girl who was developing typically and was in the fiftth grade and her 19 year old sister who was diagnosed with autism. The sibling with autism was a senior in high school and participated in both the general education and special education curriculum. She used an iPad with TouchChat along with verbal speech to communicate. She had

used an AAC device since she was in the 8th grade and had used her current device, the iPad, for 1 year.

Sibling Pair 2 consisted of an 8 year old girl who was developing typically and was in the third grade and her 11 year old sister who had cerebral palsy. The sibling with cerebral palsy was in the sixth grade and participated in both the general education and special education curriculum. She used a Vanguard with Unity Software to communicate and had used this AAC device for approximately 3 years.

Outline

This study took place across 3 phases: a baseline phase, an instructional phase, and a post-instructional phase. Instruction and data colletion took place in a game context. During the baseline phase and post-instructional phase, the sibling pairs were asked to play a game together as they normally would. During the instructional phase, the siblings developing typically participated in an instructional program where they learned the communication strategies and how to use them with their sibling who uses AAC.

Materials

Several different board games were used in the study. Refer to Table 1 for a detailed list of the games played during each session. The sibling pairs chose which game they wanted to play during each data collection session across all phases of the study. The games chosen were games that the siblings played together prior to the study or had interest in playing together the day of the session.

Table 1
Games Played During Each Session

	Sibling Pair 1	Sibling Pair 2
Baseline 1	Scrabble®	Memory®

Baseline 2	Sorry!®	War Card Game
Baseline 3	Puzzles on iPad	Uno®
Post-Instruction (All Sessions)	Puzzles on iPad	Memory®

To facilitate use of the AAC device during the game context, a communication page containing game related vocabulary was created on each participant's AAC device. To create this communication page, the principal investigator generated a list of 27 vocabulary words and phrases that could be used in a game context (Appendix F). These vocabulary words and phrases were taken from the DynaVox, Prentke-Romich, and iPad devices. Although a DynaVox device was not used in the current study vocabulary was still generated from this communication software to ensure that the words chosen reflected common vocabulary programmed to various devices. This occurred prior to the baseline phase. During the first baseline session the principal investigator gave this list to the sibling developing typically and told her to choose vocabulary words and phrases that she would like programmed on her sibling's AAC device. There was also a place on this list for the sibling developing typically to add in her own words or phrases that she would like included on the game communication page. Once the sibling developing typically chose the words and phrases, the principal investigator added them to the AAC device. Each game display page contained 22 pre-programmed vocabulary words and phrases. The different vocabulary displays were similar across participants to the extent that programming limitations of the different AAC devices would allow. The participants had access to this communication page during all phases of the study. Refer to Appendix G (Sibling Pair 1) and H (Sibling Pair 2) for a list of the vocabulary words programmed onto the each sibling pair's device.

Measures

The independent variable in the study was the communication partner instruction program. The dependent measure was the siblings' use of the communication strategies during the game context. During each session data was collected on the frequency of use of each communication strategy (aided AAC modeling, pause time, prompting). The frequency of use of each strategy was calculated as strategies used per minute. Refer to Table 2 for the operational definitions of each strategy.

Table 2
Operational Definitions of Communication Strategies

Aided AAC Modeling	Verbally saying a word or phrase out loud while simultaneously (within 5 sec) selecting that same word or phrase on the AAC device.
Pause Time	Pausing for at least 5 seconds and looking directly at the AAC user to indicate it is their turn to communicate
Prompting	Any direct verbal cue given to the AAC user to indicate that they should use their AAC device to communicate

Procedures

Baseline Phase. Baseline measures were obtained to determine the participants' current levels of performance on the dependent measures, the participants' use of the strategies. Baseline measures were taken in three different sessions for each sibling pair to ensure that consistent baseline measures were established. For Sibling Pair 1, baseline sessions one and three occurred in their home. For their second baseline session, data was taken in the Schiefelbusch Speech-Language-Hearing Clinic. For Sibling Pair 2, all baseline sessions occurred in their home. The length of each baseline session varied (range 8-25 min). The games played in each baseline session varied depending on the participants' game preferences that day. Refer to Table 1 for a list of the games played

during each session. During this phase, sibling pairs were instructed to play together as they normally would. The participants had access to the AAC device with the game communication page on the screen. Data regarding the participants' use of the communication strategies was collected. This phase, and all phases were video recorded for data analysis and reliability purposes.

Instructional Phase. During this phase the siblings who were typically developing participated in a group instruction where they learned about the three different strategies and the ways to implement the strategies. They also practiced implementing the strategies in guided practice sessions with the principal investigator and then in guided practice sessions with their sibling. A modified version of the procedures outlined in the ImPAACT program was used as a framework for instructing the participants. The instructional program consisted of six stages with the typically developing sibling involved in each stage and the sibling who used AAC involved in the final stage of the program (stage 6). During the instructional phase, the principal investigator instructed the siblings developing typically to use one of the strategies at least once during every-other one of their turns in the game. In order to complete the instructional program, the siblings developing typically had to use a strategy in 90% of their opportunities (every-other turn) with no more than 2 prompts or cues from the clinician. The instructional phase ended when the siblings developing typically met this 90% criterion for accurate implementation of the communication strategies during the game context with their sibling who used AAC. Refer to Table 3 for a brief description of the program and Appendix I for a more detailed description.

Table 3 *Brief Description of Instructional program*	
Stage	Description
1. Explanation of the Instructional Program	Principal investigator explained the instructional program, the stages of the program, and the communication strategies
2. Strategy Description	Principal investigator described the targeted strategies, the skills needed to use the strategies, and a method for remembering to use the strategies. Participants described how they could use the strategies in individual situations
3. Strategy Demonstration	Principal investigator modeled the targeted strategies and demonstrated the strategies in role-plays with the participants
4. Verbal Practice of the Strategies	Participants described all steps required to implement the targeted strategies
5. Controlled Practice and Feedback	Participants practiced implementing the strategies in a controlled context (e.g. guided role-plays with the researcher or other participant)
6. Advanced Practice and Feedback	Principal investigator modeled the use of the strategies in a game context with the AAC user. The participants practiced implementing the strategies in a game context during a 5-min guided practice session with their sibling who uses AAC. The principal investigator provided feedback during this stage.

Post-Instructional Phase. After the participants completed the instructional program a post-instructional phase occurred. This phase replicated the baseline phase with one exception. Due to a malfunction of the videotape, the third post-instructional session for Sibling Pair 1 and the first post-instructional session for Sibling Pair 2 had to be repeated. For Sibling Pair 1, post-instructional sessions one and two occurred in their home. For their third baseline session, data was taken in the Schiefelbusch Speech-Language-Hearing Clinic. For Sibling Pair 2, all post-instructional sessions occurred in their home. The sibling pairs played the same game together during each post-instructional phase. Sibling Pair 1 chose to complete puzzles during each session and

Sibling Pair 2 chose to play Memory® during each session. Refer to Table 1 for a list of the games played during each session. The participants had access to the AAC device with the same communication page on the screen that was used in all prior phases. Data regarding the participants' use of the communication strategies was collected.

Procedural Reliability

To ensure accurate implementation of the instructional program, a trained graduate student reviewed the instructional sessions to ensure the principal investigator's adherence to the outlined instructional protocol. The student used a procedural checklist, based on the instructional protocol, to determine the reliability of the sibling instruction while watching videos of the sessions. The checklist contained the steps to be included within each stage of instruction and the trained student checked off the presence or absence of each step. Refer to Appendix J for the procedural checklist. Procedural reliability was taken for all of the instructional sessions minus the advanced practice stage for Sibling Pair 2. This session was completed and videotaped with the sibling pair; however, due to a malfunction of the videotape this session could not be reviewed. Procedural reliability was calculated by dividing the number of instructional steps correctly implemented by the total number of steps correctly implemented, incorrectly implemented, and omitted. For the six stages, procedural reliability was 100%, indicating that the instructional protocol was followed adequately.

Coding

All baseline, instructional, and post-instructional phases were videotaped. The principal investigator watched each baseline and post-instructional session and coded the frequency of dependent measures used in each session. Each time the sibling used one of

the communication strategies accurately a check mark was given to indicate use of the dependent measure. After viewing each session, the principal investigator calculated the total number of strategies used by the participant during the game session.

Reliability of Data Collection

To ensure integrity and consistency of data recording, 33% of the game sessions were randomly selected, one baseline session and one post-instructional session from each sibling pair, and reviewed by a trained coder (Kennedy, 2005). The trained coder evaluated dependent measures in the same manner in which the principal investigator coded the data. Inter-rater agreement was calculated by dividing the number of agreements by the sum of the agreements, disagreements, and omissions. For the baseline sessions, the reliability averaged 87.5% (range = 75%-100%) and the post-instructional sessions averaged 97.5% (range= 95%-100%). Average reliability scores of 92.5% were maintained for the dependent variables.

Data Analysis

The data from the baseline and post-instructional sessions were graphed and visually inspected for changes in trend, slope, and level (Kennedy, 2005). The percentage of non-overlapping data (PND) points or, the percentage of points in the intervention phase that were greater than the highest point during the baseline phase, were calculated to determine the effectiveness of the intervention (Scruggs & Masteropieri, 1998). According to Scruggs and Masteropieri (1998), PND scores were rated as follows: a score greater than 90 indicates that the treatment is very effective, a score between 70-90 indicates that the treatment is effective; a score between 50-70 indicates that it is questionable; and a score below 50 indicates that the treatment is ineffective. In addition

to graphing data and visually inspecting it, data was also analyzed for changes in frequency by calculating strategies used per minute during each baseline and post-instructional session.

Chapter III: Results

Baseline Phase

At the start of the study, three baseline sessions occurred with each sibling pair. For Sibling Pair 1, the first and third baseline sessions took place in their home and the second baseline session took place in the Schiefelbusch Speech-Language-Hearing Clinic. For Sibling Pair 2, all baseline sessions took place in their home. Baseline sessions were taped to ensure that consistent baseline measures were established. During each baseline session, the siblings were instructed to play a game as they normally would. The device was in front of the siblings and they had access to the communication game page during all baseline sessions. The games played, and the amount of time it took to play the games, varied with each baseline session. During each session, data was taken regarding the typically developing siblings' use of the communication strategies while playing the game. Each session was videotaped and then reviewed again for further data collection and reliability purposes.

Sibling Pair 1. Sibling Pair 1 consisted of two sisters, an 11 year old girl who was developing typically and a 19 year old girl with autism. During the three baseline sessions, the sibling developing typically used the communication strategies .05/min, .73/min, and 0/min during the games. Refer to Table 4 for a breakdown of the specific strategies used.

Table 4
Sibling 1: Strategies Implemented in Baseline

	Baseline 1 21.25 min	Baseline 2 8.25 min	Baseline 3 25.50 min
Aided AAC Modeling	0/min 0 Total	.36/min 3 Total	0/min 0 Total
Pause Time	.05/min 1 Total	.36/min 3 Total	0/min 0 Total

Prompting	0/min 0 Total	0/min 0 Total	0/min 0 Total

Sibling Pair 2. Sibling Pair 2 consisted of two sisters, an 8 year old girl who was developing typically and an 11 year old girl with cerebral palsy. During the first two baseline sessions only the siblings participated in the game. During the third baseline session, the AAC user wasn't able to hold and lay down the cards for the game so the mother stepped in to help ensure that the AAC user could play the game. During the three baseline sessions, the sibling developing typically used the communication strategies .52/min, 0/min, and 0/min during the games. Refer to Table 5 for a breakdown of the specific strategies used.

Table 5
Sibling 2: Strategies Implemented in Baseline

	Baseline 1 23 min	Baseline 2 6.25 min	Baseline 3 19.25 min
Aided AAC Modeling	.52/min 12 Total	0/min 0 Total	0/min 0 Total
Pause Time	0/min 0 Total	0/min 0 Total	0/min 0 Total
Prompting	0/min 0 Total	0/min 0 Total	0/min 0 Total

Instructional Phase

After baseline sessions were completed, both siblings without disabilities participated in two instructional sessions, including one initial group instruction and one individual practice instruction. The group instruction took place at the Schiefelbusch Speech-Language-Hearing Clinic and the individual practice sessions took place at each participant's home. Instruction was completed over the course of a 1-week period. The participants spent approximately 2 hours receiving instruction before meeting the 90%

criterion for accurate implementation of the communication strategies during the game context. There was little variation in the instructional time required for each participant, approximately 2 hours for Sibling Pair 1 and 2 hours 15 minutes for Sibling Pair 2.

Post-Instructional Phase

Following instruction both sibling pairs participated in a post-instructional phase. This phase was identical to the baseline phase; the siblings were instructed to play as they normally would and had access to the device with the communication game page during each session. Only the siblings participated in each game session during this phase. The sibling pairs played the same game together during each of their post-instructional sessions; however, the amount of time taken to play those games varied each session.

Sibling Pair 1. During the post-instructional phase, the sibling developing typically in Sibling Pair 1 used the communication strategies 1.41/min, 1.68/min, and .52/min during each game session. Refer to table 6 for a breakdown of the specific strategies used.

Table 6
Sibling 1: Strategies Implemented Following Instruction

	Post-Instruction 1 4.25 min	Post-Instruction 2 7.75 min	Post-Instruction 3 17.25 min
Aided AAC Modeling	1.41/min 6 Total	1.55/min 11 Total	.41/min 7 Total
Pause Time	0/min 0 Total	.13/min 1 Total	.06/min 1 Total
Prompting	0/min 0 Total	0/min 0 Total	.06/min 1 Total

Results showed that following instruction the sibling developing typically in Sibling Pair 1 increased her use of the communication strategies in two of the three post-instructional sessions. The percentage of non-overlapping data (PND) between baseline

and the post-instructional phase was 66%, indicating that the treatment effectiveness was questionable (see figure 1) (Scruggs & Mastropieri, 1998).

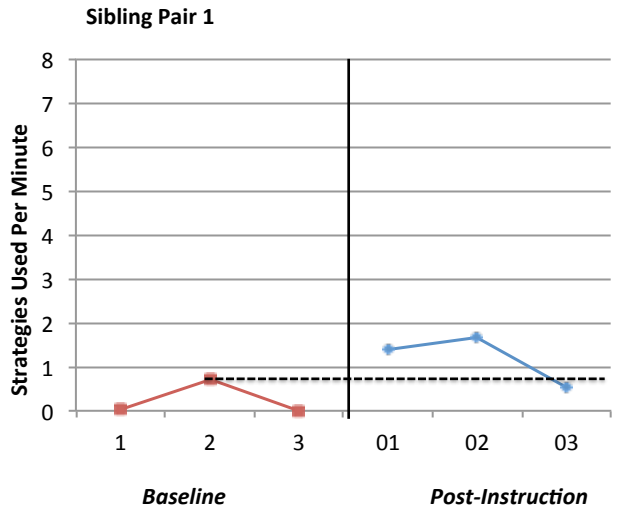

Figure 1. Sibling Pair 1 PND scores

Sibling Pair 2. During the post-instructional phase, the sibling developing typically in Sibling Pair 2 used the communication strategies 4.78/min, 4.77/min, and 7.07/min during each game session. Refer to Table 7 for a breakdown of the specific strategies used.

Table 7
Sibling 2: Strategies Implemented Following Instruction

	Post-Instruction 1 11.5 min	Post-Instruction 2 7.75 min	Post-Instruction 3 10.75 min
Aided AAC Modeling	4.52/min 52 Total	4.39/min 34 Total	6.98/min 75 Total
Pause Time	.09/min 1 Total	.13/min 1 Total	.09/min 1 Total
Prompting	.17/min 2 Total	.26/min 2 Total	0/min 0 Total

Results showed that following instruction the sibling developing typically in Sibling Pair 2 increased her use of the communication strategies during all post-instructional sessions. The percentage of non-overlapping data between the baseline and post-instructional phase was 100%, indicating that the instruction was highly effective (see figure 2) (Scruggs & Mastropieri, 1998). The results from this sibling pair support the notion that with only a few hours of instruction communication partners can learn to use communication strategies frequently and consistently. Refer to Figure 3 for a comparison between the sibling pairs' PND scores.

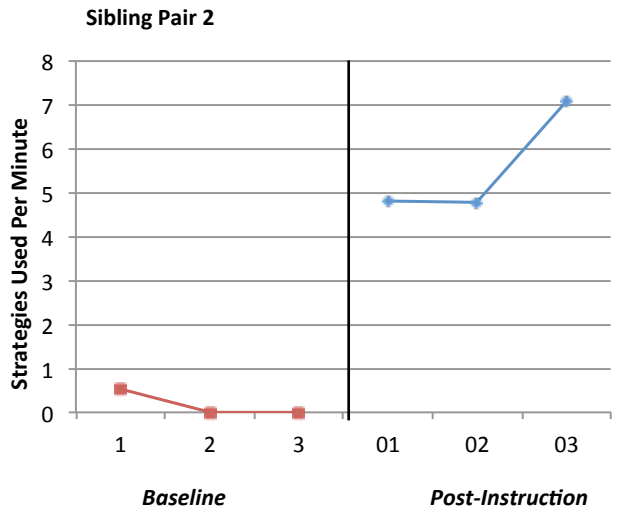

Figure 2. Sibling Pair 2 PND Scores

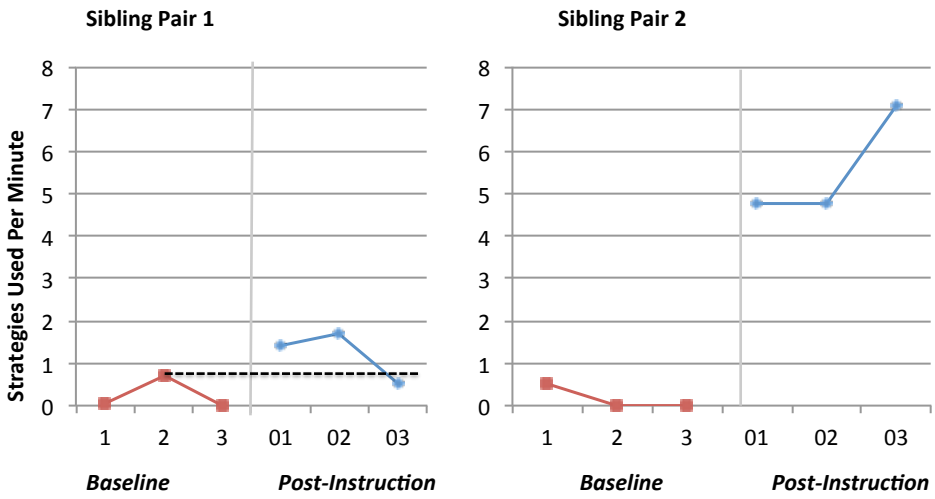

Figure 3. Comparison of Sibling Pairs' PND scores

Chapter IV: Discussion

The aim of this study was to determine if teaching communication strategies to siblings of AAC users increased their use of these strategies in a game context with their sibling. Communication is a dynamic and complex process. In order for interactions to be effective and beneficial for communication partners, each individual participating in the communicative exchange must have the necessary skills to make that interaction successful. For individuals who use AAC, success during communicative interactions depends in part on the communication skills and interaction styles of their communication partners. Several studies have focused on providing communication partner instruction to parents of AAC users and their educational support staff. However, no studies to date have focused specifically on providing communication partner instruction to siblings of AAC users, even though they may be one of the user's most significant and frequent communication partners.

For this study, siblings of AAC users participated in a communication partner instruction program where they learned how to use communication strategies with their sibling who used AAC. Data was collected on the siblings' use of the communication strategies in a game context before and after communication strategy instruction. The results regarding the siblings' use of the communication strategies will be discussed and interpreted, and a discussion of clinical implications of the findings will follow.

Sibling Pair 1

Results showed that following instruction the sibling developing typically in Sibling Pair 1 increased her use of the communication strategies in two of the three sessions. The percentage of non-overlapping data between baseline and the post-

instructional phase was 66%, indicating that the effectiveness of the instruction was questionable.

During the baseline phase, the sibling developing typically used the communication strategies infrequently. During the post-instructional sessions, however, the sibling developing typically increased her use of the strategies in two of the three sessions. The sibling's increase of the communication strategies in two sessions during this phase could be attributed to several things. First, during the baseline phase the sibling pair played a different game each session. During the post-instructional phase, however, the sibling pair played the same game during each session. This consistency provided a familiar context where the sibling could implement the communication strategies. It became routine for her to model certain words during parts of the game and to provide pause time after each activity was completed. This routine increased her use of the strategies in the game. In addition, during the baseline sessions the sibling developing typically had to complete both her and her sister's turn in the game because the AAC user was not engaged or interested in playing the activity. During the post-instructional phase, however, the sibling pair completed a game that the AAC user typically enjoys. The AAC user completed her turns independently and was more engaged and interested in the activities than she had been during the baseline phase. The sibling developing typically, therefore, did not have to 'play' for her sibling during the post-instructional phase. This gave the sibling developing typically more time and opportunities to use the communication strategies because she was not spending her time and energy playing the game for two people.

During the final session in the post-instructional phase, the sibling developing typically decreased her use of the communication strategies from the second session in the baseline phase. Therefore, her PND score was 66% indicating that the treatment for this sibling pair was questionable. There are multiple variables that could have contributed to this finding. First, the game setting was not a typical setting where the siblings interacted. Therefore, even after instruction, implementing the learned communications strategies during the game context may still have been unnatural or strange for the sibling developing typically. She may have increased her use of the communication strategies in a context more natural and typical to her and her sibling. In addition, there was an 8-year age difference between the two siblings, with the sibling developing typically being younger than the AAC user. This age difference may have made it challenging for the sibling developing typically to use some of the communication strategies. For example, the younger sibling may have felt uncomfortable directing her much older sister to use her device by using the prompting strategy. Therefore, even after knowing how and when to use the strategies, she may have felt uncomfortable using them with her older sister. Another potential variable that could have affected the sibling's strategy use relates to how the device is typically used in the home setting. According to the mother, the AAC user primarily uses verbal speech in the home and infrequently uses the AAC device to communicate. The device is typically used by the AAC user for the Internet and is rarely used for communication purposes at home. During the game, it may have been unnatural and even unusual for the sibling developing typically to use the device for communication purposes because it is

infrequently used for these reasons at home. Overall, there are several variables that could contribute to the sibling's use of communication strategies following instruction.

Sibling Pair 2

Results showed that following instruction the sibling developing typically in Sibling Pair 2 increased her use of the communication strategies in all post-instructional sessions. The percentage of non-overlapping data between the baseline and post-instructional phase was 100%, indicating that the instruction was highly effective. These increases support the notion that with only a few hours of instruction communication partners can learn to use communication strategies frequently and consistently.

During the baseline phase, the sibling developing typically used the communication strategies infrequently. During the post-instructional session, however, the sibling developing typically significantly increased her use of the strategies in each session. This increase could be attributed to several things. First, similar to Sibling Pair 1, the siblings played the same game during each post-instructional session. This consistency provided a familiar context in which the sibling could implement the communication strategies. For example, several vocabulary phrases applied well into the game they were playing (e.g. "which one?", "you pick", "my turn") therefore, it was routine for the sibling to model those phrases during each turn. In addition, during the baseline phase it was hard to establish a game that the sibling with cerebral palsy could play because she had limited gross and fine motor movements. It was challenging for her to independently complete the activities because she wasn't able to complete the motor movements that were required for the game (e.g., holding cards, moving pieces). The sibling developing typically often had to help her sibling during every turn. By the time

the post-instructional sessions began, however, both the sibling developing typically and the principal investigator understood how to best set up the activity so that the AAC user could play the game without much help from another person. This may have given the sibling developing typically more time and opportunities to use the strategies because she was not playing the game for both herself and her sibling. Another variable contributing to the sibling's increase could be due to the verbal praise and encouragement given by the principal investigator after the advanced practice session and first post-instructional session. The principal investigator discussed with the sibling developing typically how well she was doing using the strategies and would give her information regarding the amount of communication strategies she was using. After this verbal praise and encouragement, the sibling developing typically continued to try and increase the amount of strategies she used, knowing that the principal investigator was keeping track of this behavior. This could have contributed to her using the strategies so frequently, especially in the final session when she used aided AAC modeling an average of 6.9 times/min.

Themes Among Both Sibling Pairs

Although the results varied regarding the amount of strategies used by each sibling from the baseline phase to the post-instructional phase, there were several common themes that emerged from the findings. First, the siblings developing typically made little to no change in their use of pause time and prompting after instruction. The sibling developing typically in Sibling Pair 1 decreased her use of pause time and the sibling developing typically in Sibling Pair 2 only slightly increased her use of pause time following instruction. There may be several reasons for this finding. First, pause time was operationally defined as pausing for at least 5 seconds and looking directly at the AAC

user to indicate it is their turn to communicate. The siblings developing typically often paused and looked directly at the AAC user during the post-instructional phase, however, both AAC users in the study would respond before 5 seconds had passed. The siblings, therefore, did not receive credit for using pause time. The data, then, may not be reflective of the actual interaction styles between the siblings in regards to pause time.

In addition, there were little to no significant changes in the use of prompting by the siblings developing typically. The siblings developing typically in both sibling pairs only slightly increased their use of prompting following instruction. Traditionally, prompting is used to cue the AAC user to communicate or encourage the AAC user to participate in an activity. During this study, however, the only responsibility of the AAC user was to play the game with their sibling. Therefore, during instruction the siblings developing typically were only instructed on the ways they could use prompting, they were not necessarily instructed to use it to facilitate communication from their sibling during the game. The siblings developing typically, therefore, may have felt it unnecessary to use prompting during the game context. Furthermore, prompting may be a communication strategy that is unnatural to use between siblings. It may be uncomfortable for a younger sibling to give a direct request to her older sibling to do something. Prompting, therefore, was a strategy that may not be the most appropriate and natural for the siblings to use with one another, especially during a game context.

Past literature has provided evidence that using aided AAC modeling is beneficial when interacting with AAC users and it is a strategy that can be taught to communication partners (Binger et al., 2008, 2010; Drager et al., 2006; Light & Binger, 2007). The findings from this current study further support this notion. Both participants increased

their use of aided AAC modeling from the baseline phase to the post-instructional phase. These results show that aided AAC modeling can be taught to communication partners, specifically siblings, and implemented appropriately by these partners during interactions with AAC users. In addition, based on these findings, it appears that it is easier for siblings to learn and implement aided AAC modeling than it is to provide pause time and use prompting strategies. These findings have clinical implications and should be taken into account when deciding what strategies to teach certain communication partners.

Overall, the results of this study support the notion that with a short amount of instruction siblings can learn to use communication strategies and will increase their use of some or all of the communication strategies when interacting with their sibling who uses AAC. There are many variables, however, that can affect the results of the communication partner instruction. Practitioners should take these variables into account when planning a communication partner instruction program.

Additional Findings

Although not directly measured, several findings were noted through informal observations and anecdotal reports. The principal investigator informally observed the AAC users' use of the device in the baseline and post-instructional phases. The AAC user in Sibling Pair 1 was not observed to make any changes in her use of the communication device between the baseline and post-instructional phases. The AAC user in Sibling Pair 2, however, was observed to use her device more in the post-instructional phase. During the baseline phase, the AAC user would navigate away from the game page and not use the vocabulary on that page. During the post-instructional phase, however, the AAC user was observed to ask questions (e.g., "Which one?", "Who goes first?) and answer

questions directed to her (e.g., “my turn”, “your turn”) using the vocabulary on the game page. Additionally, after the sessions were over, the AAC user would also request to play another game using her device. In addition to these informal observations, the mother of Sibling Pair 2 stated that after instruction the device was available to and used more by the AAC user throughout the day in the home setting. She also reported that the siblings interacted together more with the device after instruction.

In addition, according to Drager (2009) intervention should take place in natural environments to ensure that the interaction will be relevant and familiar and will facilitate spontaneous use and generalized use of skills. Previous communication partner instructions have used natural settings for instructional contexts (e.g., book reading, classroom play centers). These studies have instructed parents to implement communication strategies in book reading contexts with their children (Binger et al., 2008; Kent-Walsh et al, 2010; Rosa-Lugo & Kent-Walsh, 2008) and instructed peers and educational assistants to use the strategies in typical educational settings, such as play centers or game contexts (Binger et al., 2010; Carter & Maxwell, 1998; Trembath et al., 2009; Trottier et al., 2011). This study tried to use a context that was a ‘typical’ interaction setting for siblings. However, throughout the study the principal investigator observed that the game context was not the most natural and typical context for these sibling pairs. In families where there are siblings developing typically, playing games together may be a common type of interaction. However, in families in which one sibling has a disability with minimal communication skills and another is developing typically, playing games may be unnatural, challenging, and an activity rarely done. The principal investigator noticed that the siblings and families struggled to identify games that the

AAC users would be interested in playing and could play without the help of another person. As discussed earlier, the baseline sessions almost served as a 'trial and error' period of games that could be played. During the post-instructional phase games were identified that could be played independently by both AAC users, however they still may have not been the most enjoyable context for the sibling pairs. According to the mother of Sibling Pair 1, the AAC user infrequently interacts with the family when they are playing different types of games. In addition, prior to the study, the siblings in Sibling Pair 2 rarely played games together because of the AAC user's gross and fine motor limitations. These observations and reports show that a common interaction setting between siblings developing typically may not be the most appropriate or natural setting for sibling pairs in which one sibling has a disability with minimal communication skills.

Clinical Implications

There are several ways that the findings of this study might inform clinical practice as it relates to AAC communication partner instruction. Useful information was obtained relating to the effectiveness of the instructional procedures and the multiple variables that need to be taken into account before planning and implementing a communication partner instruction. However, because of the preliminary nature of this study, findings should be used with caution. A thorough review of the past research should be done before planning and developing a communication partner instruction program.

Instructional Procedures. The findings from this current study found that using a modified version of the ImPAACT program was very effective in increasing communication strategy use by one sibling, and also effective at increasing aided AAC

modeling use by another sibling. Several other studies have used the procedures outlined in the ImPAACT program and found them effective in changing the interactions style between AAC users and their communication partners. In addition, this study and the previous studies that have used these procedures have reported that the communication partners required only a short amount of instruction before accurately implementing the strategies with the AAC user (approx. 2.8 hours of instruction; range 2-5 hours). Clinical practitioners can take these findings into account and may want to use this type of program when completing communication partner instructions. This is especially applicable to those practitioners who have a limited amount of time to instruct the communication partners.

Communication Strategies. Given the current study's findings, aided AAC modeling appears to be the easiest strategy for siblings to learn and then implement with their sibling who uses AAC. Both siblings increased their use of aided AAC modeling from the baseline to the post-instructional phase, whereas there were no significant changes in their use of pause time and prompting between these two phases. Although there were several variables that could have contributed to this finding, practitioners should take these results into account when determining what communication strategies they should teach to siblings of AAC users. For example, if wanting to teach pause time during the instruction the clinician should ensure that the AAC user requires pause time during communicative interactions. Otherwise, this may not be an appropriate intervention target.

Selection of Subjects. The results from this current study revealed multiple variables relating to the selection of subjects that may have affected the effectiveness of

the instruction. First, communication partner instructions that have been completed have focused on providing instruction to parents, peers, support staff, and educational assistants (Binger et al., 2008, 2010; Carter & Maxwell, 1998; Kent-Walsh et al., 2010; Light et al., 1992; Trembath et al., 2009; Trottier et. al., 2011). Siblings of AAC users have not been participants in these communication partner instructions. Yet, siblings of AAC users are often one of the closest people in an AAC user's life. This study found that siblings of AAC users could learn to use communication strategies accurately with their sibling who uses AAC. This finding is important for practitioners to take into account when they are determining which partners are best to instruct in a communication partner instructional program. Although siblings have been rarely used in the past research, they should not be excluded as possible participants for instruction.

In addition, the age difference between one of the sibling pairs, approximately 8 years, may have prohibited the sibling developing typically from using certain communication strategies with her older sibling (e.g. prompting). When selecting sibling pairs for instruction, practitioners may want to take into account the age difference between the siblings. Those siblings who are closer in age may feel more comfortable using the communication strategies with one another than those siblings who are further apart in age. Or, if using sibling pairs who are further apart in age, the clinician may want to ensure that the sibling developing typically feels comfortable using the strategies with their older sibling.

The study also found that the way the device is used in the home setting might affect the siblings' implementation of the communication strategies. In Sibling Pair 1, the AAC user primarily used the device for Internet related purposes and rarely used the

device for communication purposes. On the other hand, the AAC user in Sibling Pair 2 had no functional speech and frequently used her device to communicate. The sibling developing typically in Sibling Pair 2 made greater gains in her use of the strategies than the sibling developing typically in Sibling Pair 1. This could be contributed to the differences in the way the device was used in the home setting. Siblings developing typically may use the device more following instruction when their sibling frequently uses the AAC device to communicate. Practitioners may want to take this finding into consideration and provide instruction to communication partners who interact with AAC users who primarily use their device for communication purposes.

For this current study, criteria to participate in the study required that sibling pairs consist of one sibling developing typically between the ages of 7 and 15 and another sibling who uses AAC. Future studies may wish to create more strict criteria for subject selection, taking into account the age difference between the siblings and the way the device is used by the AAC user.

Instructional Context. For the current study, a game context was used as the setting for instruction and data collection. The principal investigator informally observed that this context was not a typical setting where the siblings interacted. This could have contributed to the effectiveness of the instruction for both sibling pairs. In future studies, practitioners and researchers may want to ensure that the context that is being used for instruction (e.g., book reading, games, working) is a typical interaction setting between the AAC user and their communication partner. More significant results and generalization to untrained settings may be seen if the context in which the partners are instructed is a natural and typical interaction context.

Limitations of the Study

Some methodological limitations affect the strength of any conclusions that can be drawn from this study.

Participants. One limitation of the current study is that only 2 siblings developing typically were included in the study. This limits the generalizability of results due to a small sample size. In addition, both siblings developing typically were between the ages of 8 and 10; therefore, results may not generalize to other siblings who are older or younger than this age. Moreover, two sister pairs were the participants in this study. It is possible that the results may not generalize to sibling pairs consisting of a brother and sister or two brothers. There are several limitations relating to the amount and types of participants used in the study, therefore results may not generalize to other participants.

Contexts. In addition to a small sample size, another potential limitation of the study is the narrow context in which the instruction took place. Conclusions regarding the efficacy of treatment must be limited to game context activities. Generalizations cannot be made regarding the siblings' use of the communication strategies in other contexts (e.g., meal time, book reading, watching television). In addition, because the game context was not a typical interaction setting for the sibling pairs, it is hard to determine if results were affected from the instruction and design of the study or the context in which the siblings were instructed to implement the strategies.

Methods. Limitations existed in the methodology and design of the study. Due to the time constraints surrounding the study, maintenance and generalization phases could not be conducted. Conclusions cannot be made regarding the effects of the study being

maintained over time and generalized to other contexts. It is unknown if the siblings continued to use the strategies after the post-instructional phase. In addition, because a generalization phase could not be completed it is unknown if the siblings developing typically used the strategies in contexts other than the game setting.

Future Directions

This study attempted to provide more in-depth knowledge regarding the various partners that could be used during an AAC communication partner instruction program. Specifically, this study aimed to determine if teaching communication strategies to siblings of AAC users would increase their use of these strategies in a game context with their sibling. This area of research was lacking; parents, peers, and educational assistants have primarily been used in AAC communication partner instruction programs, not siblings of AAC users. This study was preliminary, using a small and limited sample, so there are numerous remaining areas in which additional research is needed.

Future studies could confirm whether the findings from this study are replicable with other siblings developing typically. Only two siblings were used in this study. In order to strengthen the findings future research needs to determine if instructing more siblings developing typically how to use communication strategies will result in greater use of the strategies during interactions with AAC users. In addition, instructing a more diverse group of sibling pairs (e.g., a brother/sister pair, two brothers, older or younger sibling pairs) may provide additional insight into the effectiveness of communication partner instruction using different types of sibling pairs.

Further investigations could also aim to determine if providing instruction to

siblings in other contexts and activities (e.g., book reading, imaginative play, meal time) will result in the siblings increasing their use of the strategies in these various contexts. This could help in determining the most appropriate or natural context in which to provide sibling instruction. In addition, future research could determine whether change in the sibling's use of the communication strategies causes change in the quality or quantity of their interactions with their sibling who uses AAC.

Finally, this current study used a modified version of the ImPAACT program. Several studies have used this program for communication partner instruction and found that communication partners positively changed their interaction styles with AAC users. It would be advantageous for future investigations to use these procedures with siblings of AAC users, without making modifications.

AAC researchers and speech-language professionals are continuing to learn more about how communication partners' interaction styles affect the quality of communicative interactions with AAC users. In addition, researchers and speech-language professionals are working to modify the interaction styles of communication partners in hopes that communicative interactions will become more beneficial and supportive for the AAC user. This study aimed to provide information in an unresearched area of communication partner instruction. Research in this area is needed in order to enhance the communicative interactions between AAC users and their communication partners.

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Appendix A

Hello XX,

My name is Brittany Jansen and I am a graduate student in the Department of Speech-Language-Hearing: Sciences and Disorders at the University of Kansas. I am currently conducting a research study and would like permission to contact your schools' speech-language pathologists via e-mail. I would like to ask the SLPs in the Lawrence school district to distribute informational flyers about my research study to families of children who use augmentative and alternative communication devices. My goal is to recruit participants from your school district for this study that will take place outside of school.

The purpose of my study is to investigate if teaching communication strategies (modeling of the AAC system, prompting, pause time) to siblings of AAC users increase their use of these strategies in a game context (e.g. board games).

Attached to this e-mail is the flyer I will distribute to the SLPs if given permission to contact them.

If you have any questions please contact me via e-mail at b143j256@ku.edu

Thank you for your time,
Brittany Jansen

Appendix B

Hello XX,

My name is Brittany Jansen and I am a graduate student in the Department of Speech-Language-Hearing: Sciences and Disorders at the University of Kansas. I am currently conducting a research study and was hoping you could help me in recruiting families for my study. This study will take place outside of school.

The purpose of my study is to investigate if teaching communication strategies (modeling of the augmentative and alternative [AAC] system, prompting, pause time) to siblings of AAC users increase their use of these strategies in a game context (e.g. board games).

I have attached an informational flyer about my study. Would you be willing to distribute these flyers to families who you serve who have children that use AAC? If so, I will print and mail you the number of flyers you would need to distribute to the families. You could also print the flyers from this e-mail and distribute them as soon as you would like.

I appreciate you taking the time to assist me in recruiting families for my research study.

If you have any questions please contact me via e-mail at b143j256@ku.edu or contact my research advisor, Dr. Jane Wegner, jwegner@ku.edu

Thank you for your time,
Brittany Jansen

Appendix C

Sibling Communication and AAC

Who?

- Families with a child who is typically developing between the ages of 7-15 and another child who uses AAC (any age).

What?

- A research study focusing on teaching siblings different ways to communicate with their brother or sister who uses AAC.

When?

- The study is estimated to take place over 10 sessions with sessions lasting from 30 minutes to 2 hours.

Using speech generating devices to communicate during play

Where?

- The study will take place in your home or a convenient setting for you.

If interested please contact Brittany Jansen at b143j256@ku.edu or Jane Wegner at jwegner@ku.edu for more information

*This study is affiliated with the University of Kansas Department of Speech-Language-Hearing: Sciences and Disorders

*Augmentative and Alternative Communication (AAC) is any form of communication (other than verbal speech) that a person uses to express their thoughts, needs, wants, and ideas. AAC can include gestures, sign language, picture communication boards, and/or speech-generating devices.

Appendix D

Sibling Communication and Augmentative and Alternative Communication (AAC)

INTRODUCTION

The Department of Speech Language & Hearing at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish for your children to participate in the present study. You may refuse to sign this form and not allow your children to participate in this study. You should be aware that even if you agree to allow your children to participate, you are free to withdraw at any time. If you do withdraw your children from this study, it will not affect your relationship with this unit, the services it may provide to you, or the University of Kansas.

PURPOSE OF THE STUDY

The purpose of this study is to determine if teaching strategies (modeling of the augmentative and alternative communication [AAC] system, prompting, pause time) to your child who is typically developing will help him/her talk more effectively with your child who uses AAC.

Augmentative and Alternative Communication (AAC) is any form of communication (other than verbal speech) that a person uses to express their thoughts, needs, wants, and ideas. An AAC system can be unaided and relies on a person's body to convey the message. Unaided systems can include gestures, sign language, and/or body language. Aided AAC systems require the use of a piece of equipment along with the person's body to communicate. Examples of aided AAC systems include a paper and pencil, picture symbol communication boards, and/or speech generating devices.

PROCEDURES

The study will be completed in 4 phases: baseline phase, instructional phase, post-instructional phase, and maintenance phase. Your child who is developing typically will participate in all phases of the study. Your child who uses AAC will participate in the entire baseline phase, post-instructional phase, and maintenance phase. In the instructional phase he/she will only participate in one part of this phase, which will take approximately one hour to complete. I will get verbal permission from your children before each session begins.

Baseline Phase

During the baseline phase I will need to see how your children are playing and talking together before instruction. This phase will take place across **3** sessions; I will come to

your home -or another location that you would prefer- and ask your children to play a game together. I will bring different games for them to choose from depending on their age (e.g. Candyland, UNO, Jenga, Trouble, Memory) or let them choose a game they have that they play together at home. While playing the game I will take data about how your children talk with one another. The three sessions will take no longer than 1 hour each to complete.

Instructional Phase
During this phase, I will teach your child who is developing typically some strategies they can use when talking with your child who uses AAC. Once again, this portion will take place in your home or another location convenient for you. It is estimated that this portion of the program will be done across 2-4 sessions, with no session lasting longer than 2 hours. This time may change depending on the participation and interest of your child while I am teaching the strategies. If other families participating in the study have children developing typically who are within 4 years of age your child developing typically, a group instruction will be offered.

It is estimated that the instructional phase will be completed within 2 weeks of the baseline phase.

Post-Instructional Phase
During this phase I will determine if your children communicate differently then they did before instruction. This phase is identical to the baseline phase and will take place across 3 sessions during 3 different days. Each of the three sessions will take no longer than 1 hour to complete.

The post-instructional phase will be completed immediately after the instructional phase. For example, if the instructional phase ends on a Saturday then the post-instructional phase will begin that Saturday, Sunday, or Monday.

Maintenance Phase
During the final phase I will see if your child who went through the instruction still uses the strategies I taught to him/her, approximately 2, 4, and 8 weeks after instruction. This phase will take place across 3 sessions during 3 different days (1 session at 2 weeks, 1 session at 4 weeks, and 1 session at 8 weeks). Your child who is developing typically and your child who uses AAC will be asked to play a game together during each session and I will take data on how your children are talking with one another. Each of the three sessions will take no longer than 1 hour to complete.

In total, the study is estimated to take approximately 10-12 hours across a period of 10-12 sessions. The total time and number of sessions may change depending on the length and format (individual or group setting) of the instructional phase.

Video recordings will be taken during all sessions in each phase of the study. Your children will be told before each session begins that to participate in the study it is 1)

required that each session be video recorded, 2) that they will be video recorded during that session, and 3) that they have the option of stopping the recording at any time throughout the study If they choose not to be video recorded they will not participate in the study.

The videotapes will be used by the researchers only; they will be used for data collection and reliability purposes. An undergraduate or graduate student in the department will transcribe the recordings. The tapes will be stored in a locked cabinet in Dr. Wegner's laboratory, 2107 Haworth Hall, when the researcher is not viewing them. Only Dr. Wegner and the researcher will have access to these recordings. The recordings will only be used for the current study and will be erased/destroyed immediately after the study is complete.

RISKS

Minimal to no risks are anticipated for this study.

BENEFITS

Because of this study, your children may learn better ways to communication with their sibling who uses AAC. In addition, your children's participation may help us to learn more about how siblings communicate with one another when one sibling uses AAC.

PAYMENT TO PARTICIPANTS

There is no payment for participants associated with this study.

PARTICIPANT CONFIDENTIALITY

Your children's names will not be associated in any publication or presentation with the information collected about your childen or with the research findings from this study. Instead, the researcher(s) will use a study number or a pseudonym rather than your children's names. Your children's identifiable information will not be shared unless (a) it is required by law or university policy, or (b) you give written permission.

Permission granted on this date to use and disclose your information remains in effect indefinitely. By signing this form you give permission for the use and disclosure of your children's information, excluding your children's name, for purposes of this study at any time in the future.

REFUSAL TO SIGN CONSENT AND AUTHORIZATION

You are not required to sign this Consent and Authorization form and you may refuse to do so without affecting your right to any services you are receiving or may receive from

the University of Kansas or to participate in any programs or events of the University of Kansas. However, if you refuse to sign, your children cannot participate in this study.

CANCELLING THIS CONSENT AND AUTHORIZATION

You may withdraw your consent to allow participation of your children in this study at any time. You also have the right to cancel your permission to use and disclose further information collected about your child, in writing, at any time, by sending your written request to: Brittany Jansen, 2101 Haworth Hall, 1200 Sunnyside Avenue, University of Kansas, Lawrence, KS 66045.

If you cancel permission to use your children's information, the researchers will stop collecting additional information about your children. However, the research team may use and disclose information that was gathered before they received your cancellation, as described above.

QUESTIONS ABOUT PARTICIPATION

Questions about procedures should be directed to the researcher(s) listed at the end of this consent form.

PARTICIPANT CERTIFICATION:

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding the study. I understand that if I have any additional questions about my child's rights as a research participant, I may call (785) 864-7429, write to the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7568, or email irb@ku.edu.

I agree to allow my children to take part in this study as a research participant. By my signature I affirm that I have received a copy of this Consent and Authorization form.

_____ _____

Type/Print Participant's Name Date

_____ _____

Type/Print Participant's Name Date

_____

Parent/Guardian Signature

Researcher Contact Information:

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Appendix E

Oral Assent for 7-12 year old child developing typically

Hi, my name is Brittany. I am doing a project for my school and I want to learn more about teaching you some ways to talk with your brother/sister that will help her/him use her/his device. Today, I would like to (activity of the day) have you and your brother/sister play a game together. It is OK if you do not want to do these activities. If you say yes, you can still stop (activity of the day) playing the game at any time. Your parent(s) know that I am asking you to do these things. Would you like to (activity of the day) play a game with your brother/sister?

Oral Assent for 13-15 year olds typically developing children

Hi, my name is Brittany. I am doing a project for the University of Kansas and want to learn more about teaching you helpful tips and strategies to use when talking with your sibling with her device. Learning these tips may help you and your sibling communicate in a different way and can also help you and your sibling learn more about her device. Today, I would like to (activity of the day) teach you some tips to use when talking with him/her. It is OK if you do not want to do these activities. If you say yes, you can still stop (activity of the day) learning the strategies at any time. Your parent(s) know that I am asking you to do these things. Would you like to (activity of the day) learn some strategies when talking with your sibling with her device?

Oral Assent for 7-12 year old AAC users (this assent will be given while using the child's AAC system)

Hi, my name is Brittany. I am doing a project for my school and I want to learn more about teaching your sister/brother ways to talk with you with your device. Today, I would like to (activity of the day) have you and your sister/brother play a game together. It is OK if you do not want to do these activities. If you say yes, you can still stop (activity of the day) playing the game at any time. Your parent(s) know that I am asking you to do these things. Would you like to (activity of the day) play a game with your sister/brother?

Oral Assent for 13-15 year old AAC users

Hi, my name is Brittany. I am doing a project for the University of Kansas and want to learn more about teaching your sister/brother helpful tips and strategies to use when talking with you with your device. Learning these tips may help you and your sibling communicate in a different way and may also help you both learn more about your device. Today, I would like to (activity of the day) have you and your sister/brother play

a game together. It is OK if you do not want to do these activities. If you say yes, you can still stop (activity of the day) playing the game at any time. Your parent(s) know that I am asking you to do these things. Would you like to (activity of the day) play a game with your sister/brother?

Appendix F

Your turn	I don't know
My turn	Please
Don't cheat!	What are you doing?
No fair!	Sorry
Let's take a break.	That's a bummer
Let's play!	Wait for me
This is fun	Cool
Hang on	Awesome
Help!	I win!
I got this game!	I lost.
Do over!	Just kidding.
Who goes first?	_____
Let's go play OK?	_____
It's mine.	_____
That one?	_____
You pick.	_____

Appendix G

Your turn
My turn
Don't cheat
Awesome
I win
I lost
Let's take a break
This is fun
Help
Cool
Hang on
What are you doing?
I got this game!
Quit
Do over
I like this
That's a bummer
Who goes first
I don't know
Just kidding
That stinks
Sorry

Appendix H

Your turn
My turn
Let's take a break.
Let's play
This is fun
Hang on
Help
Do over
Who goes first
Let's go play
Which one?

Please
What are you doing?
Sorry
Wait for me
Cool
Awesome
I win
I lost
Just kidding
Quit
You pick

Appendix I

1. Explanation of Instructional Program	During this first stage, the researcher explained the purpose of the instructional program and the communication strategies that would be taught to the participants. The researcher explained the importance of using the communication strategies with their sibling and how use of these strategies could benefit their sibling. For example, the researcher said "Using your sister's AAC system when you talk with her (modeling of the AAC system) shows her different ways to use the AAC device and also can make her feel more comfortable to use the device on her own." The researcher explained the stages involved in the instructional program (e.g. stages 1-6). This stage concluded once the oral assent was given and the participants verbally agreed to continue on with the program.
2. Strategy Description	During this stage, the researcher described the targeted strategies (AAC modeling, prompting, pause time), the skills needed to use the strategies, and provided a method for remembering to use the strategies (e.g. MPP). The researcher and participants discussed the positive impacts of implementing the strategies. For example, the researcher asked "Why do you think it's important to give pause time when interacting with your sibling?" or "What could happen if you don't wait to let your sister say something?" Next, the researcher prompted the participants to discuss how they could use these strategies in individual situations. For example, the researcher asked the participant to explain how they could provide pause time while playing a board game. This stage concluded once the participants discussed the advantages of using the strategies and each participant provided one situation to use each strategy in (e.g. Participant 1 gave situations for prompting, modeling, and pause time).
3. Strategy Demonstration	The researcher modeled use of the targeted strategies while using a think aloud strategy to explain the steps performed. For example, when demonstrating pause time the researcher may have said "I see that you are looking for something on the device, so I will wait for you to find what you are looking for before starting the game again or asking another question." The use of the targeted strategies was demonstrated during role-plays with the participants. This stage concluded when all three strategies were demonstrated in a role-play with participants.
4. Verbal Practice of the Strategies	The researcher asked the participants to practice naming and describing all steps required to implement the targeted strategies. For example, the participant could have explained that modeling requires them to say the word, phrase, or sentence aloud and also

	activate those same words on the AAC device. This stage concluded when the participant independently, or when given minimal feedback by the researcher (no more than 3 cues or prompts total) described each strategy and the skills needed to correctly implement the strategy.
5. Controlled Practice and Feedback	Each participant practiced implementing the strategies in a controlled context (e.g. guided role plays with the researcher or other participant). The guided role-play lasted 5 minutes and consisted of the researcher (or other group learner) and the participant playing a game together. The researcher instructed the participant to use one of the strategies at least once during every-other one of their turns in the game. The researcher gradually faded the use of prompts, cues, and feedback as the participant became more proficient in implementing the strategies during every-other turn. The 5-min guided role plays continued until the participant used the strategies in 90% of their opportunities with no more than 2 prompts or cues from the researcher. For example, if the participant had 20 turns and they were instructed to try and use a strategy at least every-other turn then they would meet the criteria if they used a strategy in at least 9 different opportunities. Once the participant reached these criteria and verbally expressed their willingness to practice the strategies with their sibling they moved on to the final stage.
6. Advanced Practice and Feedback	During this stage, the researcher modeled the use of the strategies in a game context with the AAC user. Next, the participant practiced implementing the strategies in a game context during a 5-min guided practice session with their sibling who uses AAC. The researcher provided feedback during this stage. The 5-min guided practice sessions continued until the participant used a strategy in 90% of their opportunities with no more than 2 cues or prompts from the clinician.

Appendix J

Stage 1:

_____ PI explains the purpose of the instructional program

_____ PI lists the 3 strategies that will be taught to the participants

_____ PI explains the importance of using the strategies with their siblings

_____ PI explains the stages involved in the instructional program (stages 1-6)

_____ PI gives the oral assent and the participants verbally agree to continue on with the program

Stage 2:

_____ PI describes the targeted strategies (AAC modeling, prompting, pause time), the skills needed to use the strategies, and provides a method for remembering to use the strategies (e.g. MPP)

_____ PI and participants discuss the positive impacts of implementing the strategies (each participant gives at least one advantage to using a strategy)

_____ PI prompts each participant to describe a situation in which they could use each strategy. Each participant gives 3 different situations in which they can use each strategy

Stage 3:

_____ PI models use of each targeted strategy and uses a think-aloud strategy to explain the steps performed

_____ PI models each strategy during a role-play with participants

Stage 4:

_____ PI asks the participants to practice naming and describing all steps required to implement the targeted strategies

_____ PI ends this stage when each participant describes each strategy and the skills needed to correctly implement the strategy

Stage 5:

_____ The PI instructs each participant to use one strategy in at least every-other one of their turns during the game

_____ The PI (or 2nd learner) and the participant play a game together for at least 5 min. and the participant practices the strategies. The PI fades the use of feedback, cues, and prompts as the participant becomes more proficient in implementing the strategies

_____ Guided role-plays continue until each participant uses the strategy in 90% of their opportunities with no more than 2 cues or prompts from the PI. For example, if during the 5 minute game the participant has 20 turns and they are instructed to try and use a strategy at least every-other turn then they would meet the criteria if they used a strategy in at least 9 different opportunities

_____ PI ends the stage when each participant meets these criteria (90% mastery with no more than 2 cues) and they agree to practice the strategies with their sibling

Stage 6:

_____ The PI models the use of the strategies in a game context with the AAC user

_____ The participant practices implementing the strategies during a 5-min guided practice session with their sibling who uses AAC. The PI provides feedback, when necessary, during this stage.

_____ The 5-min guided practice sessions continue until the participant uses a strategy in 90% of their opportunities (every-other turn) with no more than 2 cues or prompts from the PI